

2010 MCAS Exam Test Items

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Test item alignment to
Energy 1: Integrating Sciences through Energy
Questions 1,10 & 20 directly align.

XVI. Science and Technology/Engineering,
Grade 5

Grade 5 Science and Technology/Engineering Test

The spring 2010 grade 5 MCAS Science and Technology/Engineering test was based on learning standards in the Massachusetts *Science and Technology/Engineering Curriculum Framework* (2006). The *Framework* identifies four major content strands, listed below. Page numbers for the grades 3–5 learning standards appear in parentheses.

- Earth and Space Science (*Framework*, pages 26–29)
- Life Science (Biology) (*Framework*, pages 46–49)
- Physical Sciences (Chemistry and Physics) (*Framework*, pages 64–66)
- Technology/Engineering (*Framework*, page 86)

The *Science and Technology/Engineering Curriculum Framework* is available on the Department website at www.doe.mass.edu/frameworks/current.html.

In test item analysis reports and on the Subject Area Subscore pages of the MCAS *School Reports* and *District Reports*, Science and Technology/Engineering test results are reported under four MCAS reporting categories, which are identical to the four framework content strands listed above.

Test Sessions

The MCAS grade 5 Science and Technology/Engineering test included two separate test sessions. Each session included multiple-choice and open-response questions. Approximately half of the common test items are shown on the following pages as they appeared in test booklets.

Reference Materials and Tools

The use of bilingual word-to-word dictionaries was allowed for current and former limited English proficient students only, during both Science and Technology/Engineering test sessions. No other reference tools or materials were allowed.

Cross-Reference Information

The tables at the conclusion of this chapter indicate each released and unreleased common item's reporting category and the framework learning standard it assesses. The correct answers for released multiple-choice questions are also displayed in the released item table.

Science and Technology/Engineering

SESSION 1

DIRECTIONS

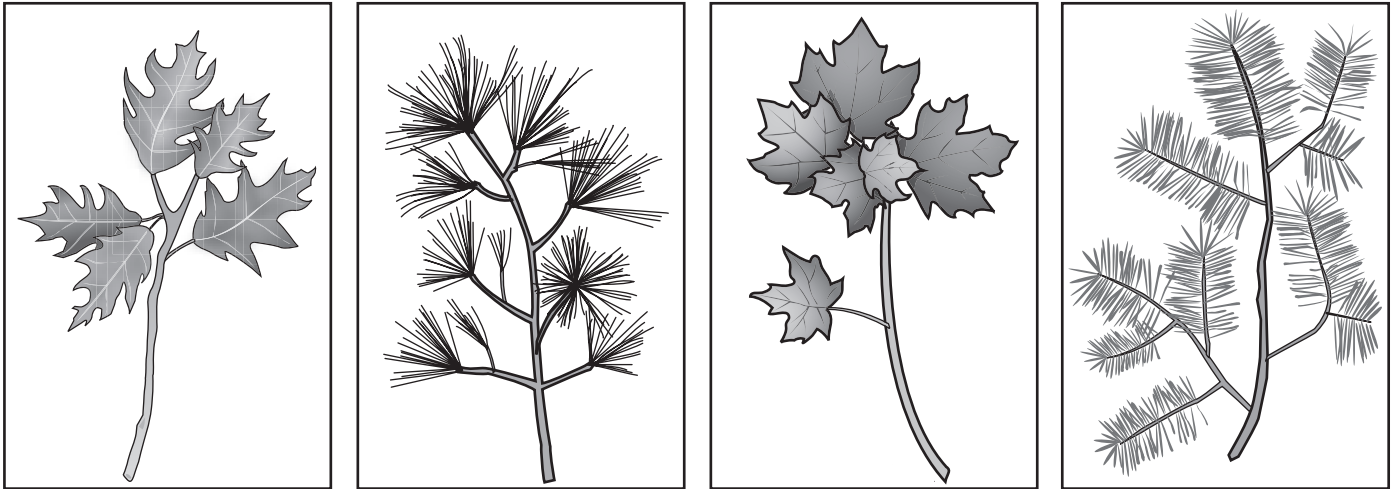
This session contains seven multiple-choice questions. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 1 Francis plugged a toaster into an electric outlet. He put a piece of bread in the toaster and turned the toaster on. While the toaster was on, it changed the electrical energy from the outlet into other forms of energy.

Which form of energy toasted the bread?

- A. chemical
- B. heat
- C. magnetic
- D. sound

- 2 The pictures below show parts from four different plants.



Based on the pictures, which of the following physical characteristics would be **best** to use to sort the plants into two groups?

- A. the shape of the leaves
- B. the length of the leaves
- C. the length of the branches
- D. the thickness of the branches

- 3 Skyler is selecting the kind of paper he wants to use to make a greeting card. He wants to select paper that does not tear easily.

Which of the following features of the paper is **most** important for Skyler to consider?

- A. color
- B. size
- C. smoothness
- D. thickness

- 4 Which of the following is **most likely** a learned behavior?

- A. using a fork to eat
- B. jumping at a loud noise
- C. squinting in a bright light
- D. sneezing when smelling a flower

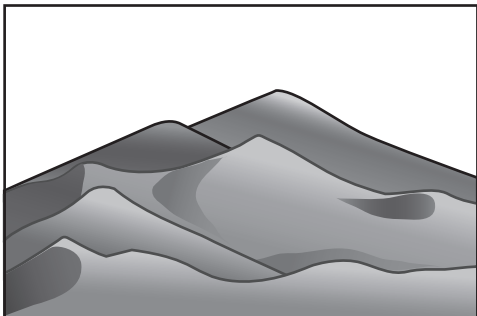
- 5 The students in an engineering class built a robot that stacks wooden blocks. A built-in computer controls the movement of the robot.

The computer in the robot performs a function **most** similar to which part of the human body?

- A. lungs
- B. heart
- C. brain
- D. arms

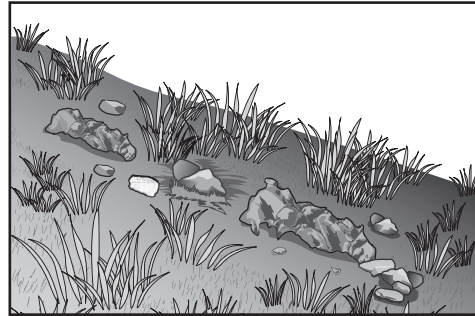
- 6 In which of the following locations is new soil likely to form at the **slowest** rate over time?

A.



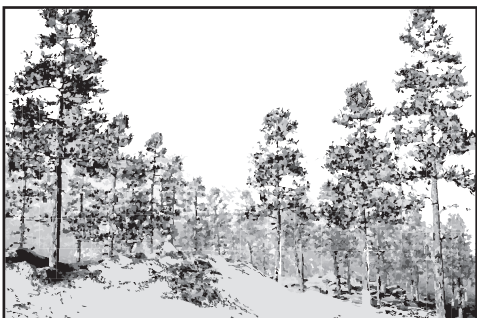
Desert

C.



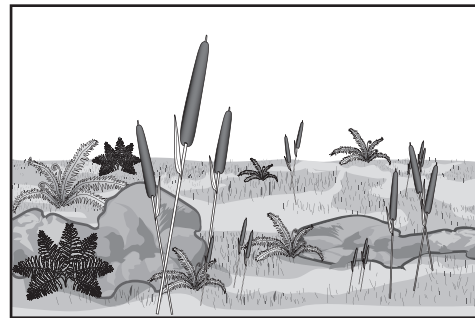
Hillside

B.



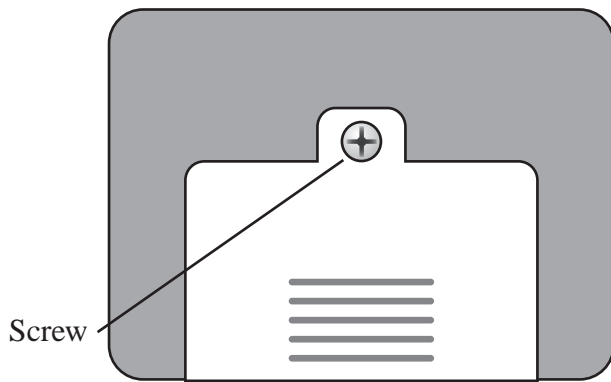
Forest

D.



Marsh

- 7 The diagram below shows a screw on the bottom of a toy.



Which of the following questions can best be answered by using this diagram?

- A. How strong is the screw?
- B. What material is the screw made of?
- C. Which tool should be used to turn the screw?
- D. How many times should the screw be turned?

Science and Technology/Engineering

SESSION 2

DIRECTIONS

This session contains twelve multiple-choice questions and two open-response questions. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 8 Which of the following characteristics will **best** prevent a tree from being blown over by high winds during a storm?

A. deep roots
B. long branches
C. thick bark
D. wide leaves

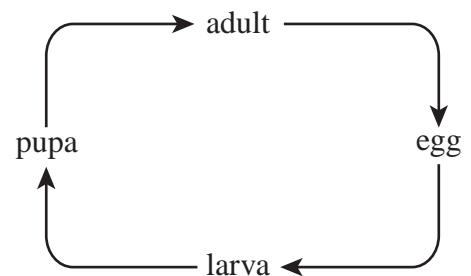
- 9 All the ponds in an area dried up during a drought. The population of which of the following animals that live in the area is **most** affected by the drought?

A. deer
B. frog
C. hawk
D. squirrel

- 10 Which of the following **best** describes the climate of an area?

A. the high temperature and wind speed for six months
B. the high temperature and wind speed each day for one year
C. the temperature and precipitation every hour for one day
D. the average temperature and total precipitation each month for ten years

- 11 The diagram below shows the life cycle of an organism.



Which of the following organisms has a life cycle like the one shown in the diagram?

A. a bird
B. a butterfly
C. a frog
D. a snake

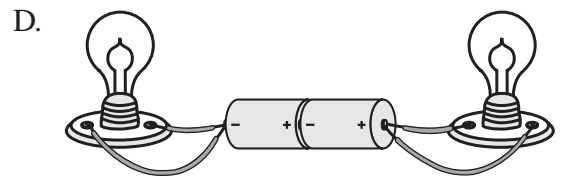
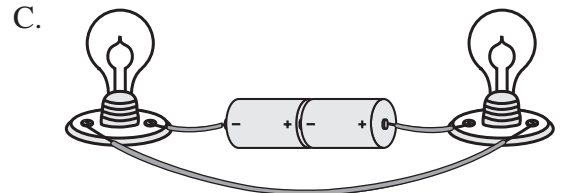
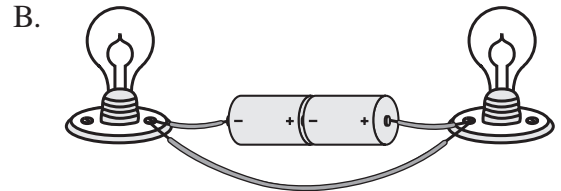
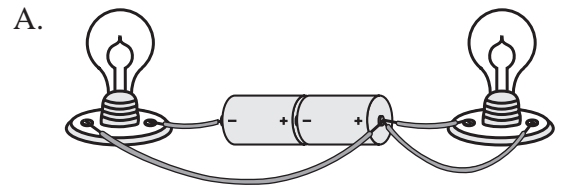
- 12 Owen tested a physical property of a mineral. He rubbed a mineral sample on a piece of white tile. The mineral left a red mark on the tile.
- Which of the following physical properties of the mineral was Owen **most likely** testing?
- A. cleavage
 - B. hardness
 - C. luster
 - D. streak
- 13 Which of the following must all plant and animal species do in order for each species to survive?
- A. migrate
 - B. reproduce
 - C. make food
 - D. change color
- 14 Which of the following metals will be attracted to a magnet?
- A. copper
 - B. gold
 - C. iron
 - D. silver

- 15 Corals are small marine organisms that live in groups and make hard outer skeletons to protect their bodies. Over time, these outer skeletons can build up to make large coral reefs.

Which of the following statements **best** describes one way the formation of a coral reef changes the ocean ecosystem?

- A. It makes the ocean water saltier.
- B. It removes sand from the ocean floor.
- C. It causes ocean waves to become stronger.
- D. It creates a habitat for some ocean animals.

- 16 In which circuit are **both** bulbs lit?



- 17 An athlete is choosing a material for his eyeglass frames. He wants a material that will not be easily damaged when he plays sports. The table below shows some characteristics of four different materials.

| Material | Strength | Flexibility | Damaged by Heat or Cold? |
|----------|-------------|--|--------------------------|
| 1 | very strong | slightly flexible | yes |
| 2 | strong | flexible, can be bent or twisted easily | no |
| 3 | very strong | very flexible, goes back into shape after twisting or crushing | no |
| 4 | strong | slightly flexible | no |

Which material would be **best** for the athlete to choose for his eyeglass frames?

- A. material 1
- B. material 2
- C. material 3
- D. material 4

- 18 A morning glory is a type of flowering vine that climbs trees and fences. Which of the following behaviors **most** helps a morning glory plant climb a fence?

A. stems curling in response to touch
B. stems swelling in response to water
C. flowers opening in response to light
D. roots growing in response to gravity

- 19 A student observed the Moon on a Tuesday. She drew a picture of its shape in her journal, as shown below.



Approximately how long will the student have to wait before she can see the Moon with this same shape and position again?

A. 7 days
B. 14 days
C. 28 days
D. 365 days

Questions 20 and 21 are open-response questions.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 20 in the space provided in your Student Answer Booklet.

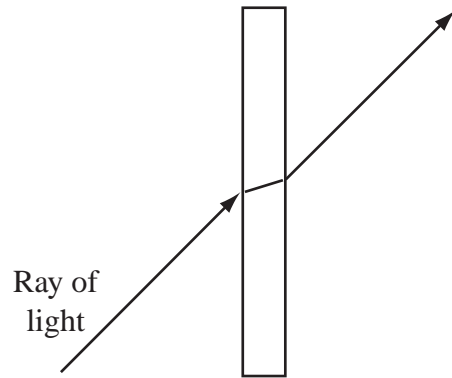
- 20** Some of the water in Lake Erie may one day fall as rain in the city of Boston. The map below shows the locations of Lake Erie and Boston.



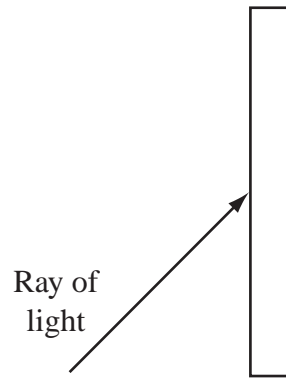
Describe how the water cycle could cause some of the water in Lake Erie to one day fall as rain in the city of Boston. Be sure to identify **each** part of the water cycle in your response.

Write your answer to question 21 in the space provided in your Student Answer Booklet.

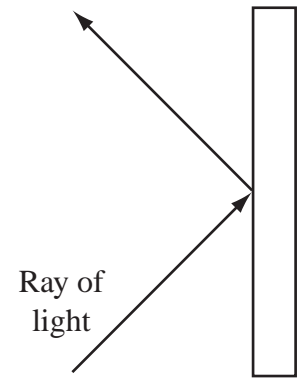
- 21** Each picture below shows a ray of light interacting with a different surface. One surface is a shiny metal, one surface is clear plastic, and one surface is painted black.



Surface 1



Surface 2



Surface 3

- Identify which surface is most likely made of a shiny metal. Explain your answer.
- Identify which surface is most likely made of clear plastic. Explain your answer.
- Identify which surface is most likely painted black. Explain your answer.

**Grade 5 Science and Technology/Engineering
Spring 2010 Released Items:
Reporting Categories, Standards, and Correct Answers***

| Item No. | Page No. | Reporting Category | Standard | Correct Answer (MC)* |
|----------|----------|---|----------|----------------------|
| 1 | 257 | Physical Sciences (Chemistry and Physics) | 5 | B |
| 2 | 258 | Life Science (Biology) | 1 | A |
| 3 | 258 | Technology/Engineering | 2.3 | D |
| 4 | 258 | Life Science (Biology) | 8 | A |
| 5 | 259 | Technology/Engineering | 2.4 | C |
| 6 | 260 | Earth and Space Science | 4 | A |
| 7 | 261 | Technology/Engineering | 2.2 | C |
| 8 | 262 | Life Science (Biology) | 2 | A |
| 9 | 262 | Life Science (Biology) | 7 | B |
| 10 | 262 | Earth and Space Science | 9 | D |
| 11 | 262 | Life Science (Biology) | 4 | B |
| 12 | 263 | Earth and Space Science | 2 | D |
| 13 | 263 | Life Science (Biology) | 3 | B |
| 14 | 263 | Physical Sciences (Chemistry and Physics) | 10 | C |
| 15 | 264 | Life Science (Biology) | 10 | D |
| 16 | 264 | Physical Sciences (Chemistry and Physics) | 6 | C |
| 17 | 265 | Technology/Engineering | 1.1 | C |
| 18 | 266 | Life Science (Biology) | 9 | A |
| 19 | 266 | Earth and Space Science | 15 | C |
| 20 | 267 | Earth and Space Science | 10 | |
| 21 | 268 | Physical Sciences (Chemistry and Physics) | 12 | |

* Answers are provided here for multiple-choice items only. Sample responses and scoring guidelines for open-response items, which are indicated by shaded cells, will be posted to the Department's website later this year.

**Grade 5 Science and Technology/Engineering
Spring 2010 Unreleased Common Items:
Reporting Categories and Standards**

| Item No. | Reporting Category | Standard |
|-----------------|--|-----------------|
| 22 | <i>Earth and Space Science</i> | 1 |
| 23 | <i>Physical Sciences (Chemistry and Physics)</i> | 1 |
| 24 | <i>Earth and Space Science</i> | 12 |
| 25 | <i>Life Science (Biology)</i> | 1 |
| 26 | <i>Physical Sciences (Chemistry and Physics)</i> | 8 |
| 27 | <i>Earth and Space Science</i> | 5 |
| 28 | <i>Physical Sciences (Chemistry and Physics)</i> | 3 |
| 29 | <i>Earth and Space Science</i> | 13 |
| 30 | <i>Physical Sciences (Chemistry and Physics)</i> | 2 |
| 31 | <i>Earth and Space Science</i> | 11 |
| 32 | <i>Life Science (Biology)</i> | 11 |
| 33 | <i>Technology/Engineering</i> | 2.1 |
| 34 | <i>Earth and Space Science</i> | 3 |
| 35 | <i>Earth and Space Science</i> | 8 |
| 36 | <i>Life Science (Biology)</i> | 5 |
| 37 | <i>Physical Sciences (Chemistry and Physics)</i> | 7 |
| 38 | <i>Physical Sciences (Chemistry and Physics)</i> | 9 |
| 39 | <i>Life Science (Biology)</i> | 6 |
| 40 | <i>Earth and Space Science</i> | 14 |
| 41 | <i>Life Science (Biology)</i> | 7 |
| 42 | <i>Physical Sciences (Chemistry and Physics)</i> | 11 |